


# Fabrication of catheter-type oximeter probe

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Wireless implantable catheter-type oximeter designed for cardiac oxygen saturation

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## Detailed protocol

### Procedure:

1. Laser cutter process the copper-clad polyimide, to generate the flexible printed circuited board (fPCB, 1.3 mm x 20 mm) for the probe;
2. Solder the electronics components (LEDs and photodiode) on the surface of the fPCB;
3. Polydimethylsiloxane (PDMS) is mixed with 5% Silc-Pig silicone opaque dye (black);
4. PDMS films are formed by spin-casting (150 rpm) on glass slides;
5. PDMS films are thermally cured in a 70°C oven for 30 mins;
6. CO<sub>2</sub> laser define the small cuboid structures (L x W x H: 1 mm x 0.5 mm x 0.8mm) for light block;
7. Two light block modules are glued to fPCB;
8. Solder the Teflon-coated copper wires to the end of the fPCB;
9. Insert the electronics module and the thin wires into a flexible tube;
10. Mix the biocompatible silicone prepolymer with 5% of Silc-Pig silicone opaque dye (blue);
11. Inject the silicone prepolymer into the tube, using a syringe;
12. The tube is cured for 12 hours at room temperature;
13. The flexible tube is removed, and the catheter-type probe is generated;
14. Attaching the other side of the Teflon-coated wires to an electronic connector finishes the fabrication of the catheter-type probe.

### Materials:

1. Copper-clad polyimide: Cu/PI/Cu, 18/75/18 um, AP8535R, Dupont, Pyralux;
2. Solder paste:
  - a. Indalloy 290, Indium Corporation.
  - b. SMDLTLFP, Chip Quick Co.
3. PDMS: Sylgard 184, Dow Chemical Co.;
4. Flexible tube: Tygon S3 E3630 Flexible Tubings, Fisher Scientific;
5. Biocompatible silicone polymer: MED-1000, Avantor;

### Equipment:

1. Laser cutter: ProtoLaser U4, LPKF Co.;
2. CO<sub>2</sub> laser: ILS12.75, Universal Laser Systems Inc.

**How to cite:** (Readers should cite both the Bio-protocol preprint and the original research article where this protocol was used)

1. Lu, W. , Bai, W. , Ge, Z. and Rogers, J. (2021). Fabrication of catheter-type oximeter probe. Bio-protocol Preprint. [bio-protocol.org/prep898](https://bio-protocol.org/prep898).
2. Lu, W., Bai, W., Zhang, H., Xu, C., Chiarelli, A. M., Vázquez-Guardado, A., Xie, Z., Shen, H., Nandoliya, K., Zhao, H., Lee, K., Wu, Y., Franklin, D., Avila, R., Xu, S., Rwei, A., Han, M., Kwon, K., Deng, Y., Yu, X., Thorp, E. B., Feng, X., Huang, Y., Forbess, J., Ge, Z. and Rogers, J. A. (2021). Wireless implantable catheter-type oximeter designed for cardiac oxygen saturation . Science Advances 7(7). DOI: [10.1126/sciadv.abe0579](https://doi.org/10.1126/sciadv.abe0579)

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